

# JOB POSTING

**Recruiting organisation:**

Fraunhofer Institute for Chemical Technology  
ICT, Germany

**Subproject title:**

Electroorganic synthesis of reactive intermediates

**Starting date:**

1st September 2023 (or earlier if preferred)

**Salary:**

The Doctoral Network "MiEI" is financed by the European Union under the framework of the program HORIZON Europe, Marie Skłodowska-Curie Actions. The doctoral candidate will be hired for 36 months under contract by the Fraunhofer-Gesellschaft e.V., Fraunhofer-Institut für Chemische Technologie, with a monthly gross salary of approx. 3200 € (including mobility allowance, but excluding other allowances that depend on eligibility, e.g. family allowance, special needs allowance).

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**Background information:**

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Marie Skłodowska-Curie Doctoral Networks are joint research and training projects funded by the European Union. Funding is provided for doctoral candidates from both inside and outside Europe to carry out individual project work in a European country other than their own. The training network "MiEI" is made up of 10 partners, coordinated by Fraunhofer ICT in Germany. The network will recruit a total of 12 doctoral candidates for project work lasting for 36 months.

New industrial production strategies like "production on demand" and "Industry 4.0" are increasing the demand for new digital concepts for the chemical industry that are easily scalable and can work like a construction kit. In addition, the reduction of fossil fuel consumption requires novel synthesis concepts with on-demand capabilities paired with the use of electrical

energy as a primary source for chemical processes.

MiEI will address this demand from the chemical industry, combining the advantages of electrochemistry, micro process engineering and flow chemistry. The recruited researchers will explore new models for electrodes and electrochemical flow cells, and develop innovative integrated prototype cells using printed circuit board (PCB) technology as a mass-scalable and flexible tool. These cutting-edge technologies will be applied to promising fine chemical and pharmaceutical synthetic routes, which will be further accompanied by techno-economic evaluation defining new business opportunities. The new MiEI technologies and processes will allow safe, flexible and sustainable synthetic routes for the chemical industry of the future.

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**Job description:**

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The advertized subproject is fully funded by the Marie Skłodowska-Curie European Training Network „MiEI“. It will be carried out by one doctoral candidate at the Fraunhofer Institute for Chemical Technology ICT (PhD supervision Karlsruhe Institute of Technology) over a period of 36 months.

Fraunhofer ICT is a research facility with many years of experience in the field of chemical engineering and electrochemistry. The electrolysis group manages research projects on power-to-X processes for the generation of green reaction products and highly reactive intermediates. Process development ranges from initial feasibility studies of innovative chemical syntheses to the transfer, scaling, and characterization of continuous-scale process systems.

The recruited researcher will explore a synthetic route for the case study of non-aqueous electrosynthesis. In detail, highly reactive intermediates (preferably diazo reagents) will be targeted, which are remarkably versatile intermediates for the atom- and step-efficient

realization of a variety of different reactions in fine chemical synthesis. The researcher will be responsible for the development of these novel electro-organic methods for the in-situ synthesis of reactive intermediates. Starting with the basic electrochemical characterization of the redox system, she/he will transfer the methodology to continuous processing using MiEl's prototype cells and model support for process intensification. By this means, the scalability of the system toward L/h production will be evaluated, and the product scope using different precursors will be screened. The researcher will further evaluate consecutive reaction processes to illustrate the whole value-added chain.

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#### **Benefits:**

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The recruited researcher will have the opportunity to work as part of an international, interdisciplinary team of 12 doctoral candidates, based at universities and industrial firms throughout Europe. She/he will be supported by two mentors within the MiEl project, and will have multiple opportunities to participate in professional and personal development training. Through her/his work she/he will gain a unique skill-set comprising electrosynthesis, flow chemistry and process analytical technologies, as well as modern control engineering techniques. She/he is expected to finish the project with a PhD thesis and to disseminate the results through patents (if applicable), publications in peer-reviewed journals and presentations at international conferences.

All employees at Fraunhofer ICT benefit from flexible working hours and the option to work from home. Fraunhofer supports an optimal balance between family and career.

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#### **Requirements:**

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##### ***Qualifications / experience:***

- In accordance with the European Union's funding rules for doctoral networks, applicants must NOT yet have a PhD

- Excellent Masters degree in chemistry or chemical engineering with a focus on electrochemistry or organic chemistry
- Strong interest in electrochemistry and experimental cross-disciplinary work at the interface of organic chemistry and engineering
- Familiarity with lab equipment, including chemical handling procedures and attention to detail as well as environmental, health and safety (EHS) requirements
- Working knowledge in the field of electrochemistry and/or laboratory experience in the design, synthesis and characterization (NMR, UV/vis, FT-IR, HPLC, GC etc.) of novel molecules is advantageous
- Fundamental math and analytical skills including experience with data collection and data analysis
- Excellent communication skills and willingness to work in collaborative projects with multiple partners
- Ability to speak effectively in front of large groups (conferences, project meetings, customers)
- Very good English language skills (German is beneficial)
- Self-motivation and the ability to achieve goals independently as well as to contribute effectively to the team

##### ***Mobility:***

The applicant must not have resided or carried out her/his main activity (work, studies etc.) in Germany for more than 12 months in the past 3 years.

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#### **How to apply:**

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Please send your CV by e-mail (preferred) or by post, quoting the reference „MiEl 1DC-ICT“:

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Joseph-von-Fraunhoferstraße 7  
76327 Pfinztal, Germany

***Application deadline:*** 15<sup>th</sup> March 2023